

We Claim as Our Invention:

1. An electronic settlement system, comprising:
 - a data storage device in which value information is stored;
 - a client device provided with an information input and output function to the data storage device;
 - a store device for providing at least one of commodities and services;
 - a settlement management device for managing settlement between the data storage device and the store device; and
 - a communication system for connecting the client device, the store device, and the settlement management device so as to enable bidirectional communication;
- 10 wherein the settlement management device creates, based on settlement request information from the store device, settlement information for making settlement by the data storage device, subjects the settlement information to an encryption processing by using a common key shared by the settlement management device and the data storage device, and transmits the settlement information subjected to the encryption processing to the client device, and wherein the client device outputs the settlement information received from the settlement management device to the data storage device.
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- 20 2. An electronic settlement system according to claim 1, wherein the store device creates a first signature indicating validity of the settlement request information by using a secret key of the store device, and transmits the settlement request information with the first signature to the settlement management device, and wherein the settlement management device checks validity of the first signature received from the store device by using a public key corresponding to the secret key of the store device.
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- 30 3. An electronic settlement system according to claim 2, wherein the settlement request information with the first signature is transmitted to the settlement management device through the client device.

4. An electronic settlement system according to claim 2, wherein the settlement management device creates a second signature indicating validity of the settlement information with the first signature by using a secret key of the settlement management device, and transmits the settlement information given the second
5 signature and subjected to the encryption processing to the client device, and wherein the client device checks validity of the second signature received from the settlement management device by using a public key corresponding to the secret key of the settlement management device, and then outputs the settlement information to the data storage device.

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5. An electronic settlement system according to claim 1, wherein the settlement management device creates settlement completion information, creates a third signature indicating validity of the settlement completion information by using the secret key of the settlement management device, and transmits the settlement
15 completion information including the settlement information and given the third signature to the store device, and wherein the store device checks validity of the third signature received from the settlement management device by using the public key corresponding to the secret key of the settlement management device.

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6. An electronic settlement system according to claim 5, wherein the store device receives the settlement completion information with the third signature, creates settlement completion receipt information with a fourth signature by using a secret key of the store device, and transmits the settlement completion receipt information with the fourth signature to the client device, and wherein the settlement
25 management device and the client device check validity of the fourth signature received from the store device by using a public key corresponding to the secret key of the store device.

7. An electronic settlement system according to claim 1, wherein the
30 store device is a mall including a plurality of lower store devices.

8. A settlement management device which can update value information stored in a data storage device through a client device, comprising:

an encryption part for subjecting value update information of the data storage device to an encryption processing by using a common key shared by the settlement management device and the data storage device; and

5 a transmitting part for transmitting the value update information subjected to the encryption processing to the client device and, wherein the client device inputs the received value update information to the data storage device.

10 9. A settlement management device according to claim 8, wherein the settlement management device creates a fifth signature indicating validity of the value update information by using a secret key of the settlement management device, and transmits the value update information with the fifth signature to the client device, and wherein the client device checks validity of the fifth signature received 15 from the settlement management device by using a public key corresponding to the secret key of the settlement management device, and then inputs the value update information to the data storage device.

10. A settlement management device for managing settlement between a data storage device which stores value information and a store device which provides 20 at least one of commodities and services, the settlement management device comprising:

25 a settlement information creation part for creating, based on settlement request information from the store device, settlement information for making settlement by the data storage device;

a settlement information encryption part for subjecting the settlement information to an encryption processing by using a common key shared by the settlement management device and the data storage device; and

30 a settlement information output part for outputting the settlement information subjected to the encryption processing to the data storage device through a client device provided with an information input and output function to the data storage device.

11. A settlement management device according to claim 10, wherein the
store device creates a first signature indicating validity of the settlement request
information by using a secret key of the store device, and transmits the settlement
request information with the first signature to the settlement management device, and
5 wherein the settlement management device checks validity of the first signature
received from the store device by using a public key corresponding the secret key of
the store device.

12. A settlement management device according to claim 11, wherein the
10 settlement management device creates a second signature indicating validity of the
settlement information with the first signature by using a secret key of the settlement
management device, and transmits the settlement information given the second
signature and subjected to the encryption processing to the client device which can
check validity of the second signature by using a public key corresponding to the
15 secret key of the settlement management device and output it to the data storage
device.

13. A settlement management device according to claim 10, wherein the
settlement management device creates settlement completion information, creates a
20 third signature indicating validity of the settlement completion information by using
a secret key of the settlement management device, and transmits the settlement
completion information including the settlement information and given the third
signature to the store device which can check validity of the third signature by using
a public key corresponding to the secret key of the settlement management device.

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14. A settlement management device according to claim 13, wherein the
store device receives the settlement completion information with the third signature,
creates settlement completion receipt information with a fourth signature by using a
secret key of the store device, and transmits the settlement completion receipt
30 information with the fourth signature to the settlement management device, and
wherein the settlement management device checks validity of the fourth signature

received from the store device by using a public key corresponding to the secret key of the store device.

15. A computer program for causing a computer to function as a
5 settlement management device for updating value information stored in a data
storage device through a client device, wherein the settlement management device
subjects value update information of the data storage device to an encryption
processing by using a common key shared by the settlement management device and
the data storage device, and transmits the value update information subjected to the
10 encryption processing to the client device, and wherein the client device inputs the
received value update information to the data storage device.

16. A computer readable storage medium for storing a computer program
for causing a computer to function as a settlement management device which can
15 update value information stored in a data storage device through a client device,
wherein the settlement management device subjects value update information of the
data storage device to an encryption processing by using a common key shared by
the settlement management device and the data storage device, and transmits the
value update information subjected to the encryption processing to the client device,
20 and wherein the client device inputs the received value update information to the data
storage device.

17. A store device for providing at least one of commodities and services
based on settlement made through a settlement management device between the store
25 device and a data storage device storing value information, the store device
comprising:

a settlement request information creation part for creating settlement request
information;

30 a first signature creation part for creating a first signature indicating validity
of the settlement request information by using a secret key of the store device; and

a settlement request information transmission part for transmitting the
settlement request information with the first signature to the settlement management

device which can check validity of the first signature by using a public key corresponding to the secret key of the store device.

18. A store device according to claim 17, wherein the settlement
5 management device creates, based on the settlement request information from the store device, settlement information for making settlement by the data storage device, subjects the settlement information to an encryption processing by using a common key shared by the settlement management device and the data storage device, and transmits the settlement information subjected to the encryption
10 processing to a client device, and wherein the client device outputs the settlement information received from the settlement management device to the data storage device.

19. A store device according to claim 17, wherein the settlement request
15 information with the first signature is transmitted from the store device to the settlement management device through a client device.

20. A store device according to claim 17, wherein the settlement
management device creates settlement completion information, creates a third
20 signature indicating validity of the settlement completion information by using a secret key of the settlement management device, and transmits the settlement completion information including the settlement information and given the third signature to the store device, and wherein the store device checks validity of the third signature received from the settlement management device by using a public key
25 corresponding to the secret key of the settlement management device.

21. A store device according to claim 20, wherein the store device
receives the settlement completion information with the third signature, creates
settlement completion receipt information with a fourth signature by using the secret
30 key of the store device, and transmits the settlement completion receipt information
with the fourth signature to the settlement management device and the client device,
and wherein the settlement management device and the client device check validity

of the fourth signature received from the store device by using the public key corresponding to the secret key of the store device.

22. A computer program for causing a computer to function as a store
5 device for providing at least one of commodities and services based on settlement
made through a settlement management device between the store device and a data
storage device storing value information, wherein the store device includes a
settlement request information creation part for creating settlement request
information, a first signature creation part for creating a first signature indicating
10 validity of the settlement request information by using a secret key of the store
device, and a settlement request information transmission part for transmitting the
settlement request information with the first signature to the settlement management
device which can check validity of the first signature by using a public key
corresponding to the secret key of the store device.

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23. A computer readable storage medium for storing a computer program
for causing a computer to function as a store device for providing at least one of
commodities and services based on settlement made through a settlement
management device between the store device and a data storage device storing value
20 information, wherein the store device includes a settlement request information
creation part for creating settlement request information, a first signature creation
part for creating a first signature indicating validity of the settlement request
information by using a secret key of the store device, and a settlement request
information transmission part for transmitting the settlement request information
25 with the first signature to the settlement management device which can check
validity of the first signature by using a public key corresponding to the secret key of
the store device.

24. A client device provided with an information input and output
30 function to a data storage device used when settlement between a store device for
providing at least one of commodities and services and the data storage device

storing value information is made through a settlement management device, the client device comprising:

a settlement information receiver part for receiving settlement information which is created by the settlement management device based on settlement request information from the store device and is subjected to an encryption processing by using a common key shared by the settlement management device and the data storage device; and

a settlement information output part for outputting the settlement information received from the settlement management device to the data storage device.

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25. A data storage device storing value information used when settlement between the data storage device and a store device for providing at least one of commodities and services is made through a settlement management device, comprising a device for inputting settlement information, which is created by the 15 settlement management device based on settlement request information from the store device and is subjected to an encryption processing by using a common key shared by the settlement management device and the data storage device, through a client device provided with an information input and output function to the data storage device.

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26. A data storage device according to claim 25, wherein the data storage device is an IC card.

27. An electronic settlement method in which a client device, a store 25 device, and a settlement management device are connected so as to enable bidirectional communication, the electronic settlement method comprising the steps of:

30 creating settlement information for making settlement by the data storage device storing value information, based on settlement request information from the store device;

subjecting the settlement information to an encryption processing by using a common key shared by the settlement management device and the data storage device; and

transmitting the settlement information subjected to the encryption processing

5 to the client device.

28. An electronic settlement method according to claim 27, wherein the store device creates a first signature indicating validity of the settlement request information by using a secret key of the store device, and transmits the settlement request information with the first signature to the settlement management device, and wherein the settlement management device checks validity of the first signature received from the store device by using a public key corresponding to the secret key of the store device.